Lab #1 - Extraction
Technique of extraction
Polarity, immiscible, density
Acid-base neutralization

\[
\begin{align*}
&\text{C}_6\text{H}_5\text{O}^- + \text{H}_2\text{CO}_3^- \\
&\text{C}_6\text{H}_5\text{OH} + \text{H}_2\text{O}
\end{align*}
\]

pKa

\[
\begin{align*}
&5 \quad 7 \quad 10 \quad 16
\end{align*}
\]

Increasing acid strength
Increasing base strength

Drying agent, recrystallization, mp

Lab #2 - TLC
Polarity as the basis of separation
Stationary + Mobile phases
Preparing, developing, and visualizing a TLC plate
Interpret Rf values

Lab #4 - Spectroscopy
Mechanism
Washes
Outline of IR spectroscopy
Verification of successful rxn

Principle of microscopic reversibility
For a reversible reaction, the energetically most favorable path is for the forward rxn will be the same as the reverse rxn.
Equilibrium:

thermo 1) the lowest energy point in a reversible process $\Delta E = 0$

Kinetic 2) Rate of forward + reverse processes are equal to each other.

3) No observable change in the concentration of reactants or products

Equilibrium: $R_f = R_r = k_f[A] = k_r[B]

If all other factors are equal (same $T$, ignore $A$), since $E_{ar} > E_{as}$, $k_r < k_f$.

$$\frac{[B]}{[A]} = \frac{k_f}{k_r} \Rightarrow K$$

$\alpha A + bB \rightleftharpoons cC + dD$

$$K = \frac{[C]^c[D]^d}{[A]^\alpha[B]^b}$$
Reaction progress diagram

Measure of the cumulative energy of all instances of a chemical reaction as a solution moves from 100% reactants \( \rightarrow \) 100% products.

\[ \Delta G \rightarrow \text{exergonic} \]
\[ \Delta G < 0 \rightarrow \text{exergonic} \]

\[ \Delta G = -RT + \ln K \]